Two new species of the tribe Microdontini (Diptera: Syrphidae) from China

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Abstract: The genus *Archimicrodon* Hull, 1945 is recorded for the first time from China. Two new species in the tribe Microdontini are described and illustrated: *Archimicrodon* (*Hovamicrodon*) *huayangensis* **sp. nov.** and *Paramixogaster trifasciatus* **sp. nov.** An updated key to the genus *Paramixogaster* from China is provided.

Key words: hoverflies; taxonomy; Microdontinae; key; East Asia

中国巢穴蚜蝇族二新种记述（双翅目：蚜蝇科）

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摘要：记述中国巢蚜蝇族 2 新种：华阳原巢穴蚜蝇 *Archimicrodon* (*Hovamicrodon*) *huayangensis* **sp. nov.** 和三带柄腹蚜蝇 *Paramixogaster trifasciatus* **sp. nov.**，其中原巢穴蚜蝇属 *Archimicrodon* Hull, 1945 为国内首次记录。模式标本保存于陕西理工大学。文中附有中国柄腹蚜蝇属 *Paramixogaster* 种类检索表。

关键词：蚜蝇；分类；巢穴蚜蝇亚科；检索表；东亚

Introduction

The subfamily Microdontinae (Diptera: Syrphidae) contains over 400 recorded species and is widely distributed over all continents except Antarctica. However, this group of syrphids are rarely encountered in open areas because the adults do not visit flowers but always remain close to their breeding sites. The known larvae of Microdontinae species are obligate predators of ant broods and are only found in ant nests (Cheng & Thompson 2008; Pérez-Lachaud *et al.* 2014; Reemer 2013; Reemer & Ståhls 2013). Their unique morphological features and various habits in different life stages make Microdontinae distinct from all other syrphids. This has led to their taxonomic status disputed over a long time. Most authors consider the microdontine flies as a subfamily of the Syrphidae (Cheng & Thompson 2008; Hull 1949; Reemer & Ståhls 2013; Ståhls *et al.* 2003; Verrall 1901). Others prefer to treat this group as a subtribe within the tribe Volucellini (Goffe 1952), a tribe within the subfamily Syrphinae (Williston 1886), or even risen to family rank (Speight 2010; Thompson 1972). The most recent classification divides the subfamily Microdontinae into 2 tribes, i.e.,

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Microdontini Rondani, 1845 and Spheginobacchini Thompson, 1972 (Cheng & Thompson 2008).

Early data on the microdontine species in China were mainly provided by foreign scholars. Sack (1922) first named three new microdontine species from Taiwan, China: *Microdon bicolor* Sack, 1922, *Myxogaster nigripennis* Sack, 1922 (= *Paramicrodon nigripennis* (Sack, 1922)), and *Myxogaster variegata* Sack, 1922 (= *Paramixogaster sacki* Reemer, 2013). Bezzi (1927) named *Microdon trigonospilus* Bezzi, 1927 from Henan, China. Hull (1937) named *Stenomicrodon purpureus* Hull, 1937 (= *Parocyptamus purpureus* (Hull, 1937)) from Taiwan, China. Shiraki (1930) described four genera (including three new genera) with ten microdontine species from Taiwan, China. Knutson *et al*. (1975) recorded 11 microdontine species from China. Peck (1988) recorded one microdontinae species from China. Reemer (2013) described eight genera with 29 microdontine species (including three new species) from China. Chinese scholars started studying microdontine species relatively late. Three species were recorded by Wu (1940) and Cheng (1940). A large number of new records or new species were subsequently described by Huo & Ren (2007), Cheng & Thompson (2008), Huang & Cheng (2012), and Tian *et al*. (2019). To date, eight Microdontini genera with 32 species (Huang *et al* 2012; Huo *et al.* 2017) and one Spheginobacchini genera with 3 species have been recorded from China (Thompson 1974; Cheng *et al* 1997; Huang *et al.* 2012).

During recent insect investigations in China, two species in the tribe Microdontini were discovered and are described here: *Archimicrodon* (*Hovamicrodon*) *huayangensis* **sp. nov**. and *Paramixogaster trifasciatus* **sp. nov.** Moreover, the genus *Archimicrodon* Hull, 1945 is recorded for the first time from China. Finally, an updated key to the species in the genus *Paramixogaster* from China is provided.

Material and methods

All specimens were collected by hand-net, then generally pinned directly and stored at Shaanxi University of Technology, Hanzhong, China (SUHC). External morphology was observed under Olympus SZX7 and BX43 microscopes. Habitus images of specimens were made with a Canon EOS 550D camera attached to an Olympus SZX7 microscope. Terminology follows Reemer (2012), Thompson (1999), and Cumming & Wood (2017). Body length was measured from the frontal prominence, excluding the antenna, to the apex of the abdomen. Wing length is from the base to its apex. All measures are presented in millimeters.

Type specimens are deposited in Shaanxi University of Technology.

Taxonomy

1. ***Archimicrodon* (*Hovamicrodon*) *huayangensis* Huo & Zhao sp. nov.** (Figs 1–7)
ZooBank link: urn:lsid:zoobank.org:act:BE005721-D621-49EE-A3BB-8D64051D5539

Female. Compound eye bare. Eye margins nearly parallel at level of frons and vertex, with mutual distance of posterior corners approximately 0.31 times the width of the head. A pair of shallowly angular longitudinal grooves in the central part of the frons. Ocellar triangle

equilateral. Frons and vertex shining black; black pilose, except for a few yellow pile anteriad to ocellar triangle and near to eye margin anteriolaterally. A triangular bare area posteriad to lunula. Lunula black. Antennal fossa approximately circular. Occiput in lateral view dorsally wider than ventrally; black with fine punctations; greyish-yellow pollinose. Face protruding forwards, gradually narrowing laterally downwards in frontal view; black, metallic shining; with long yellow pile pointed anteroventrally. Gena narrower; shiny black; long yellow pilose. Antenna (Fig. 4) black; scape and pedicel covered with long black pile; arista slender, bare, shorter than first flagellomere; antennal ratio approximately 2 : 1 : 3.

Mesonotum approximately 1.18 times wider than long; black to blackish-brown, shining, with postalar callus dark brown; punctate and yellow pilose, mixed with black pile on the central part. Notopleural wing shield developed, nearly semicircular. Scutellum apicomedially sulcate, with a pair of large, spatulate, apically rounded and flattened apical calcars; shining blackish-brown; yellow pilose. Pleura dark brown. Propleuron bare. Posterior anepisternum shining black-green; long yellow pilose, on the central part with an elongated triangular bare area somewhat extended to dorsal margin. Posterior katepisternum long yellow pilose dorsally. Anterior anepimeron long yellow pilose. Katepimeron convex, bare. Katatergite with brown pile in rows. Metasternum reduced, posterior margin concaved anteriorly so that sclerotised part forms a spear-shaped area; blackish-brown; bare.

Legs dark yellow, except coxae and trochanters blackish-brown and shining, fore- and mid-femora blackish-brown basally, hind-femora with black annular patch subbasally. Legs yellow pilose, except dark brown pile basally at the femora and dorsally at the tarsal segments. Dark cicatrices on tibiae medially and femora basally are clearly visible.

Wing hyaline, faintly infuscated around veins. Wing membrane microtrichose, except bare on cell r_1 posterobasally, cell r except area around vena spuria, cell bm posteriorly, cell cup anteriorly, and narrower stripe on anal lobe. Alular lobe entirely microtrichose. Stigmal crossvein present. Vein R_{4+5} with posterior appendix medially and extending into cell r_{4+5}; crossvein r-m positioned at base of cell dm; vein M_1 slightly recessive apically, joining vein R_{4+5} at perpendicular angle; vein dm-cu slightly recurrent apically, joining vein M at perpendicular angle; posteroapical corner of cell r_{4+5} and cell dm widely rounded, cell r_{4+5} with small appendix. Calypter and halter yellowish-white.

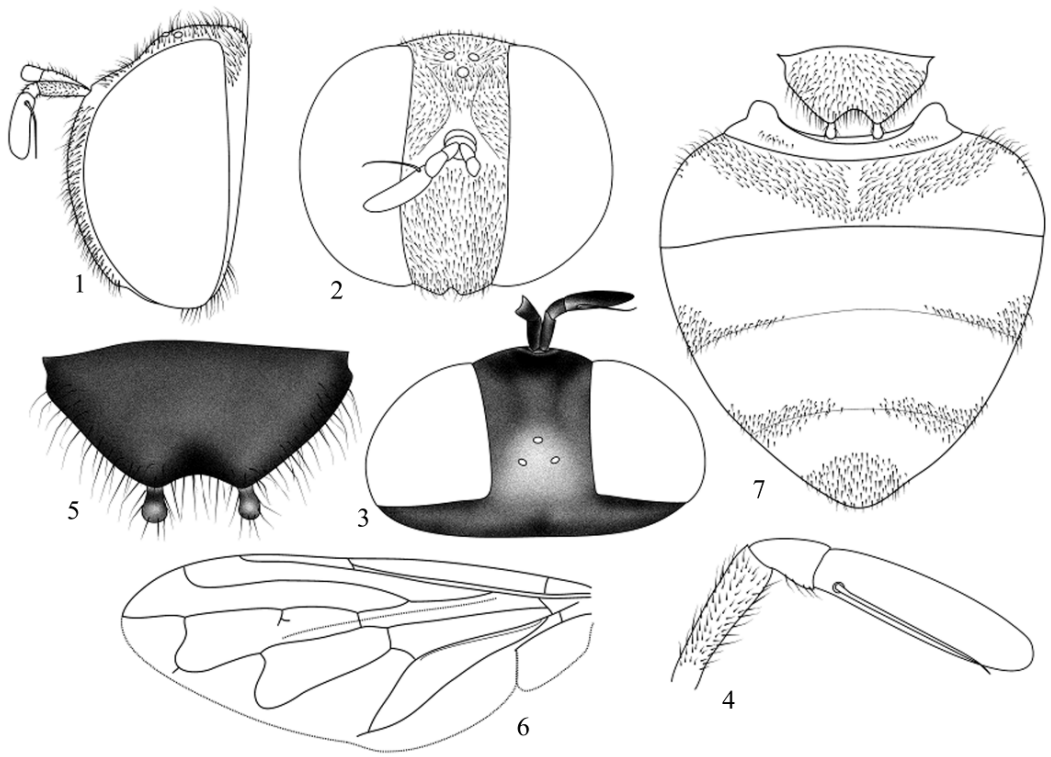
Abdomen nearly triangular, significantly wider than thorax, approximately 1.07 times longer than wide, the widest point at posterior margin of tergite 2. Tergite 2 without depressed areas; tergites 3 and 4, 4 and 5 fused; ratio of median tergal lengths of tergites 2 to 5 approximately as 1 : 1.24 : 1.63 : 1.75. Tergites blackish-brown, tergite 2 with blue shining laterally on anterior part. Tergites with fine punctations, mostly appressed black pile; tergites 2 with elongated triangular-shaped fascia of pale pile along anterior margin, medially extended to the posterior margin; tergites 3 and 4 with narrow triangular pale pile posterolaterally; tergites 5 with pale pile anterolaterally and posteriorly. Sternites dark brown, dark pilose, sternite 1 bare.

Male. Unknown.

Body length, ♀ 7 mm; wing length, ♀ 5 mm.

Holotype. ♀, **China**, Shaanxi, Yangxian County, Huayang Town, Maoping Village, 107°33’E, 33°15′N, 25-V-2019, 729 m above sea level, Yan BAI.

Etymology. This specific epithet indicates the type locality.



Figures 1–7. Female holotype of *Archimicrodon* (*Hovamicrodon*) *huayangensis* **sp. nov.** 1. Head, lateral view; 2. Head, frontal view; 3. Head, dorsal view; 4. Left antenna, outside; 5. Scutellum, dorsal view; 6. Right wing, dorsal view; 7. Scutellum and abdomen, dorsal view.

Remarks. This new species belongs to the subgenus *Hovamicrodon* Keiser, 1971 in the genus *Archimicrodon* Hull, 1945 sensu Cheng & Thompson (2008) and Reemer (2013). *Archimicrodon* is recorded for the first time from China, which has 45 species distributed in the Afrotropical, Palaearctic, Oriental, and Australian regions (Reemer 2013). It can be recognized by the following combination of characters: 1) small to moderately sized flies with oval abdomen; 2) antenna shorter than distance between antennal socket and anterior oral margin; 3) vertex flat; anterolateral corners of oral margin rounded; 4) postpronotum pilose; proepimeron bare; anepisternum widely bare medially, also on dorsal half; anepimeron entirely pilose; 5) posteroapical corner of cell r_{4+5} rectangular; vein R_{4+5} usually with posterior appendix; if not, thorax and abdomen entirely black.

Archimicrodon (*Hovamicrodon*) *huayangensis* **sp. nov.** differs from other species of the subgenus *Hovamicrodon* by the following combination of characters: antenna shorter than distance between antennal fossa and anterior oral margin; first flagellomere approximately 1.5 times as long as scape. Scutellum with large, spatulate, apically rounded and flattened apical calcars. Anterior anepimeron long yellow pilose. Abdomen nearly triangular. Posteroapical corner of cell r_{4+5} widely rounded, with a small appendix outside.

2. ***Paramixogaster trifasciatus*** **Huo & Zhao sp. nov.** (Figs 8–12)

ZooBank link: urn:lsid:zoobank.org:act:C674FDAC-FEAB-43E5-B919-C7231334544D

Male. Head wider than thorax. Compound eye bare; broadly dichoptic. Vertex dark

brown; black punctate; dark brown pilose; occupying 1/3 of total head width in frontal view; distinctly convex, ridged medially. Ocellar triangle equilateral, located on anterior portion of ridge. Occiput dorsally wider than ventrally in lateral view; blackish-brown; golden pilose. Frons convex, converged forward laterally; black, punctate with appressed short black pile. In the center of frons, a dark yellow Y-shaped sulcus with punctations and long erect golden pile, the ends of sulcus extended posteriorly to eye margins and anteriorly to lunule, and a triangular bare area posteriad to lunule. Lunula dark yellow. Antennal fossa about as wide as high. Face conspicuously narrowed laterally downwards in frontal view, and inconspicuously protruded forwards in lateral view; shallowly concave dorsolaterally and the central area forms a carinal ridge. Face orange-yellow, except infuscated brown medially, black triangular transverse patch laterad to frontal prominence; golden pilose. Gena narrow; long golden pilose. Antenna dark brown; arista slender yellow, shorter than 1/2 length of basoflagellomere; antennal ratio approximately 3 : 1 : 15.

Postpronotum bare. Mesonotum black, with coarse punctations, the middle area of transverse suture inconspicuous; mostly short dark brown pilose; conspicuous fascia of golden pile along transverse suture. On posterior mesonotum before scutellum, a semicircular patch of golden pile extends to the central area of postscutum; golden pile on postalar callus. Scutellum orange-yellow, golden appressed pilose; short, posterior margin without concavity or apical calcars. Mesopleuron dark brown. Anterior and posterior margins of anepisternum, posterior anepimeron, and katepimeron with golden pile. Katepisternum only with golden upper hair patch. Metasternum dark yellowish-brown, bare. Postmetacoxal bridge complete.

Fore leg dark yellowish-brown, except tarsi yellowish-white; pale pilose, except femora posterior and tibiae dark brown pilose; femora and tibiae somewhat swollen. Mid leg similar to fore leg. Hind leg dark yellowish brown, except coxae and femora basally blackish-brown to dark brown, apical three tarsomeres pale; light yellow pilose; femora with punctations. All femora with subbasal cicatrices.

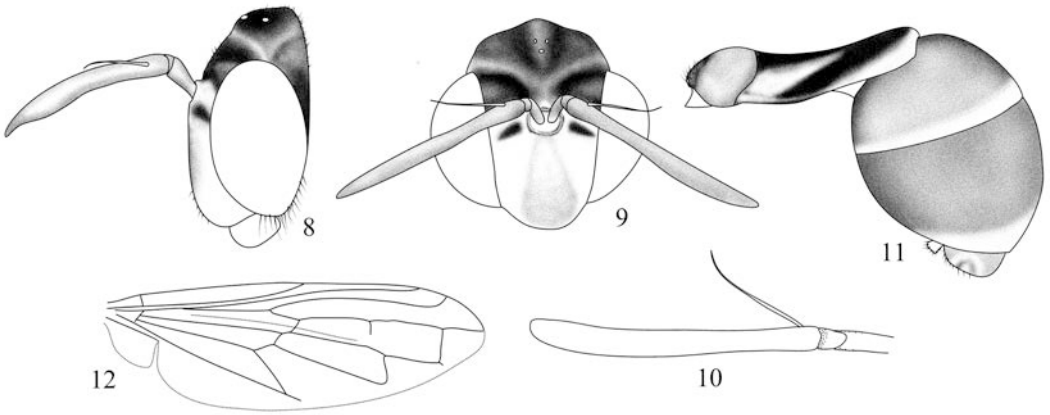
Wing hyaline, except faintly infuscated yellow at anterior of cell r_1 and apical portion of cell r_{2+3}. Wing membrane microtrichose, except bare on anterobasal and posterior margin of cell r_{4+5}, cell r except around vena spuria, cell bm, anterior and posterobasal margin of cell cua_1, cell cup except posteromedially. Vein R_{4+5} with posterior appendix medially; crossvein r-m positioned at basal of cell dm and close to vein bm-cu; vein M_1 joining vein R_{4+5} at perpendicular angle; vein dm-cu slightly recessive apically so that posteroapical corner of cell dm is obtuse.

Abdominal segment 1 trapezoidal, basal part wider than apical. Abdominal segment 2 constricted basally, as wide as tergite 1 posteriorly; slightly ridge-shaped dorsally, posterior end wider than anterior. Abdominal segments 3 and 4 swollen as subglobose-shape, with tergites distinctly margined and extending ventrally so that sternites appear narrow. Abdomen mostly dark brown, with blackish-brown thick punctation. Tergite 2 with pair of yellowish-white narrow elongated fasciae basolaterally, fasciae smooth and without pile or punctations; posterior margin orange-yellow and forward extending along lateral margin. Posterior margin of tergites 3 and 4 with orange-yellow fascia, widened medially and narrowed laterally. Tergites orange-yellow posteriorly; appressed short yellow pilose, except base of tergite 2 mainly short black pilose. Sternites dark brown; mostly narrow, strip-like in shape; sternite 1 subquadrate, yellow pilose; sternite 2 reduced, yellowish-white,

membranous.

Female. Unknown.

Body length, ♂ 7 mm; wing length, ♂ 6 mm.



Figures 8–12. Male holotype of *Paramixogaster trifasciatus* **sp. nov.** 8. Head, lateral view; 9. Head, frontal view; 10. Left antenna, inside; 11. Scutellum and abdomen, lateral view; 12. Left wing, dorsal view.

Holotype. ♂, **China**, Guangdong, Shenzhen City, Wutong Mountains, 114°21'E, 22°57′N, 927 m above sea level, 25-IV-2020, Zuqi MAI.

Etymology. The specific epithet is in reference to abdominal tergites 2–4 having light posterior margins.

Remarks. Genus *Paramixogaster* are wasp mimics. They are characterized by the following morphological features: postpronotum bare; first flagellomere usually much longer than scape and at least 3 times as long as wide; posteroapical corner of cell r_{4+5} right or sharp angle; tergite 1 and 2 usually constricted, if not, first flagellomere 2–4 times as long as scape, or the length of tergite 2 less than 1/2 of tergite 3 plus tergite 4, or face smooth medially, without transversely wrinkled texture.

About 26 *Paramixogaster* species have been recorded, with five in the Afrotropical, 12 in the Oriental, and nine in the Australasian Region. So far, four *Paramixogaster* species have been reported in China.

Paramixogaster trifasciatus **sp. nov.** is closely related or most similar to *Paramixogaster yunnanensis* Cheng, 2012. But this new species can be well-distinguished by the following combination of characters: a visible dark yellow Y-shaped concave area with golden pilosity and punctations located at frons; face without black oval bare area laterally; first flagellomere long, about 5 times as long as scape; tergite 2 with orange-yellow posterior margin, extending forwards along lateral margin; posterior margin of tergites 3 and 4 with orange-yellow fascia, widened medially and narrowed laterally.

Key to the males of *Paramixogaster* from China

1. Abdomen oval, not constricted (see fig. 19 in Sack, 1922) ····· *Paramixogaster sacki* Reemer
-. Tergites 1 and 2 constricted, petiolate; tergites 3 and 4 globular (see figs 415b, 416b in Cheng, 2012) ···· 2
2. First flagellomere 3 times as long as scape; tergite 2 petiolate, yellow; tergites 3 and 4 with blackish-brown marking laterally····· *Paramixogaster fujianensis* Cheng

-. First flagellomere 5 or 8 times as long as scape; abdomen mostly dark ····· 3

3. First flagellomere 8 times as long as scape; abdomen mostly black, except tergite 2 with yellow longitudinal fasciae basolaterally ····· *Paramixogaster yunnanensis* Cheng

-. First flagellomere 5 times as long as scape; abdomen mostly dark brown, except tergite 2 with pair of yellowish-white narrow elongated fasciae basolaterally, posterior margin orange-yellow and forwards extending forward along lateral margin; posterior margin of tergite 3 and 4 with orange-yellow fascia, widened medially and narrowed laterally ····· *Paramixogaster trifasciatus* **sp. nov.**

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